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NUTRITION STUDIES OF FOOD STUFFS USED IN THE PUERTO RICAN DIETARIES

III. THE VITAMIN G (B_2) CONTENT OF THE RIPE PLANTAIN, (*Musa paradisiaca*, L.) AND THE PIGEON PEA, (GANDUL), (*Cajan Cajan*, L.)*

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The determination of the vitamin G (B_2) content of the food stuffs used in the Puerto Rican dietaries is of importance when judged by the probable relationship which is believed to exist between the conditions observed in human pellagra and the dermatitis in rats occurring from a total absence or partial deficiency of this vitamin. The evidence gathered so far by various workers in this field of nutrition demonstrates beyond doubt that vitamin G (B_2) is of importance in nutrition.

The foodstuffs selected are used daily by the inhabitants who relish them in the various ways in which they are presented at the table. The plantains are eaten either when green or ripe. The most important dish of which they form the major portion is the "pasteles" in which the green plantains are used. The gandul is eaten either stewed alone or with rice. During the season when its price is low, two or three cents a pound, it is used instead of the navy and red kidney beans.

EXPERIMENTAL

The quantitative determination of vitamin G (B_2) by the ratgrowth method as described by Sherman and Smith (1931) requires the supplementing of a basal diet free from all water-soluble vitamins, with some source of the relatively

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heat-labile factors which is comparatively deficient in the water-soluble, heat-stable factors.

Young albino rats when twenty-eight to twenty-nine days old, reared by mothers on a diet consisting of two-thirds ground whole wheat, one-third whole milk powder, and sodium chloride and calcium carbonate to the extent of 1 per cent each of the wheat portion, with a weekly addition of about 10 grams of fresh lean beef, were placed upon the following diet: Purified casein, 18 per cent, Osborne-Mendel salt mixture, 4 per cent; butterfat, 8 per cent; cod liver oil, 2 per cent; corn-starch, 68 per cent, a part of which carried the alcoholic extract from 50 grams of whole wheat for each 100 grams of diet. The rats were placed in individual cages with raised screen bottoms and fed the basal diet alone until they ceased to grow, after which time some were fed with daily weighed portions (6 days per week) of the supplement, the vitamin G (B_2) content of which was to be determined. Others, the controls, continued receiving the basal diet alone until the end of the experimental period of eight weeks.

The plantain and pigeon peas were bought at the local market whenever needed, a fresh supply being always on hand.

The results of the experiment reported in this paper are given in terms of the Bourquin unit of vitamin G (B_2) which has been defined as that amount which when fed daily to a standard animal as described above, will permit an increase of body weight of 3 grams per week during an experimental period of 8 weeks' duration.

DISCUSSION

The average weight curves of the rats receiving the daily portions (6 days per week) of 1.00, 2.00, and 3.00 grams of ripe plantain, and the "negative controls", those receiving the basal diet alone, are shown in Figure I.

Table I gives a summary of the data obtained from these experiments. The rats receiving the 2.00 grams daily portions showed an average net gain of 23.6 grams for the 8-week experimental period, which, by definition, contains one unit of vitamin G (B_2) or vice-versa, 0.5 unit per gram of ripe plantain.

TABLE I

Supplement	No. of animals	Ave. Initial Wght. (Gms.)	Ave. net Gains (Gms.)	Ave. Survival Period (Days)	Ave. Basal Diet Intake (Grams)
Controls	8	57	—6.9	53	213
1.00 gm. plantain	13	64.4	4.5	56	297
2.00 gms. plantain	14	59.1	23.6	56	306
3.00 gms. plantain	10	52.8	48.8	56	290

Figure II gives the average weight curves of those rats which received the daily portion (6 days per week) of 0.50, 1.00 and 2.00 grams of the pigeon peas.

A summary of the experimental data obtained with these rats is given in Table II. The animals receiving 0.5 gram portions of the peas gave an average net gain of 24.6 grams, therefore the pigeon peas contained two Bourquin units of vitamin G (B_2) per gram.

TABLE II

Supplement	No. of animals	Ave. Initial Wght. (Gms.)	Ave. net Gains (Gms.)	Ave. Survival Period (Days)	Ave. Basal Diet Intake (Grams)
Controls	5	46.2	—1.00	55.8	205.8
0.50 gm. gandules	10	45.9	24.6	56	292.5
1.00 gm. gandules	10	50.4	45.1	56	366.2
2.00 gms. gandules	5	55	96.8	56	397

It will be seen that the vitamin G (B_2) content of the pigeon peas is four times that of the ripe plantain.

Other results reported in the recent literature and given by Sherman and Smith (1931) indicate that ground whole winter wheat contains 1.5 Bourquin units per gram; skimmed milk from 3 to 5 Bourquin units per gram; fresh whole milk from 0.2 to 0.3 Aykrod-Roscoe unit per cubic centimeter; dried yeast from 5 to 10 Aykrod-Roscoe units, these being about three times as large as the Bourquin units per gram, and fresh lean beef from 0.5 to 1 Aykrod-Roscoe unit per gram. It can be seen by the data, that the results obtained

from experiments with plantain and pigeon peas, compare favorably with those obtained from other sources reported above.

SUMMARY

Experiments are described by means of which the vitamin G (B_2) content of ripe plantain (*Musa paradisiaca*, L.) and pigeon peas (*Cajan Cajan*, L.) are determined.

The results obtained indicate that the ripe plantain and pigeon peas contain 0.5 and 2 Bourquin units of vitamin G (B_2) per gram respectively.

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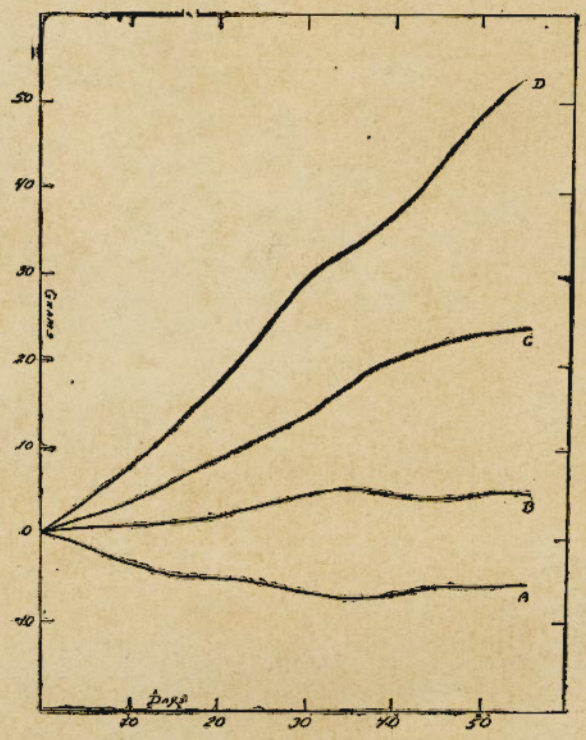

FIG. 1.—Average weight curves of comparable groups of experimental animals (rats) receiving: A, basal diet alone; B, 1.00 gram of ripe plantain; C, 2.00 grams of ripe plantain; D, 3.00 grams of ripe plantain.

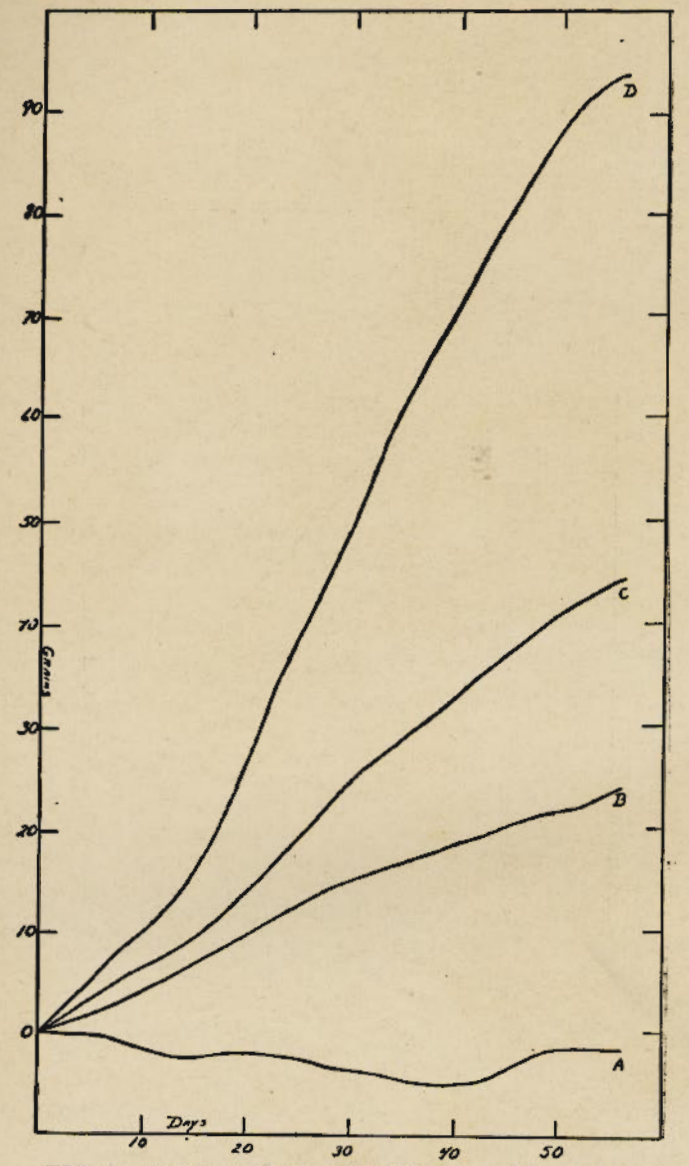

FIG. 2.—Average weight curves of comparable groups of experimental animals (rats) receiving: A, basal diet alone; B, 0.50 gram of pigeon peas; C, 1.00 gram of pigeon peas; and D, 2.00 grams of pigeon peas.